## Claims

**What is claimed is:**

1. A plasma processing apparatus for processing a substrate, comprising:

a process chamber, comprising:

a wall defining part of the process chamber; and

a device for igniting and sustaining within the process chamber a plasma for said processing; and

a plasma confinement arrangement, comprising a magnetic array having a plurality of magnetic elements that are disposed within said process chamber, said plurality of magnetic elements being configured to produce a magnetic field.

2. The apparatus, as recited in claim 1, wherein said process chamber further comprises a chuck for supporting said substrate within said plasma confined in said process chamber, wherein said chuck is spaced apart from a first end of said process chamber, wherein said plasma is ignited and sustained in a plasma region between said first end of said process chamber and said chuck, and wherein said plurality of magnetic elements are disposed around and extend along said plasma region.

3. The apparatus, as recited in claim 2, wherein said plurality of magnetic elements extend substantially from said first end of said process chamber to said chuck.

4. The apparatus, as recited in claim 3, wherein said magnetic field has an azimuthally symmetric radial gradient.

5. The apparatus, as recited in claim 4, wherein each magnetic element has a physical axis which extends along the plasma region.

6. The apparatus, as recited in claim 5, wherein each magnetic element has a magnetic axis which is substantially perpendicular to the physical axis.

7. The apparatus, as recited in claim 5, wherein said magnetic elements are permanent

magnets.

8. The apparatus, as recited in claim 5, wherein said magnetic elements are electromagnets.

9. The apparatus, as recited in claim 5, wherein said magnetic elements are individually contained within sleeves.

10. The apparatus, as recited in claim 5, wherein at least one of said magnetic elements is moved so that said magnetic field shifts over time.

11. The apparatus, as recited in claim 5, wherein said magnetic elements are rotated.

12. The apparatus, as recited in claim 2, wherein said magnetic elements are permanent magnets.

13. The apparatus, as recited in claim 2, wherein said magnetic elements are electromagnets.

14. The apparatus, as recited in claim 2, wherein said magnetic elements are individually contained within sleeves.

15. The apparatus, as recited in claim 2, wherein at least one of said magnetic elements is moved so that said magnetic field shifts over time.

16. The apparatus, as recited in claim 2 wherein said magnetic elements are rotated.

17. A method for controlling a volume of a plasma while processing a substrate in a process chamber, said chamber defined at least in part by a wall, using a plasma enhanced process, comprising:

producing a magnetic field inside said process chamber with a magnetic array located inside said chamber;

creating said plasma inside said process chamber; and

confining said plasma within a volume defined at least in part by said magnetic field.

18. The method, as recited in claim 17, further comprising the step of supporting the substrate on a chuck in the chamber, wherein the substrate is spaced apart from a first end of said process chamber, and wherein the plasma is substantially confined in a plasma region between said first end of said process chamber and said substrate, and wherein said magnetic array, comprises a plurality of magnetic elements disposed around and extending along said plasma region between said first end of said process chamber and said substrate.

19. The method, as recited in claim 18, wherein said plurality of magnetic elements extend substantially from said first end of said process chamber to said chuck.

20. The method, as recited in claim 19, wherein said first magnetic field has an azimuthally symmetric radial gradient.

21. The method, as recited in claim 20, wherein each magnetic element has a physical axis which extends along the plasma region.

22. The method, as recited in claim 21, wherein said magnetic elements are permanent magnets.

23. The method, as recited in claim 21, wherein said magnetic elements are electromagnets.

24. The method, as recited in claim 21, wherein said magnetic elements are individually contained within sleeves.

25. The method, as recited in claim 21, further comprising the step of cyclically changing the magnetic field.